

Periosteal Osteosarcoma of the Tibia

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A 14-year-old girl presented with persistent pain and swelling involving the lower leg 5 weeks after an injury caused by a hockey stick. A tender, palpable mass was present on physical examination. Plain radiography showed a mass on the cortical surface of the distal shaft of the tibia. The lesion contained radiolucent and sclerotic regions, with spicules of bone projecting away from the underlying cortex (Fig. 1A). MR imaging showed an intact cortex, without involvement of the medullary cavity. The lesion had intermediate signal intensity that was similar to that of muscle on proton density-weighted images, high signal intensity on T2-weighted images, and intense but heterogeneous enhancement after gadolinium injection (Fig. 1B). A wide surgical excision was performed. The gross specimen showed a lobulated tumor with a cartilaginous appearance, but microscopy revealed a malignant, moderately differentiated, chondroblastic lesion with osteoid elements. The final pathologic diagnosis was periosteal osteosarcoma.

Osteosarcoma is an uncommon malignant bone-forming tumor with three commonly recognized but rare variants that arise on the cortical surface: parosteal osteosarcoma, peri-

osteal osteosarcoma, and high-grade surface osteosarcoma [1-3]. Periosteal osteosarcomas comprise less than 2% of all osteosarcomas and are usually found in the diaphysis of the femur or tibia. The peak age of discovery is about 20 years, and most patients present after a few weeks or months of pain, swelling, tenderness, or mass [2]. Periosteal osteosarcomas are moderately differentiated and chondroblastic, unlike the less-rare parosteal osteosarcomas, which are well differentiated and fibroblastic. The presence of any high-grade histologic features would cause the lesion to be classified as a high-grade surface osteosarcoma [3]. Whether these surface osteosarcomas arise in the periosteum or in the outer layers of the cortex is uncertain.

On imaging, periosteal osteosarcomas appear as elongated, partially mineralized masses on the cortical surface of a long bone in the diaphyseal region, with thickened underlying cortex and solid periosteal reaction at the margins. Radiolucent regions within the tumor correspond to nonmineralized tumor cartilage, and brushlike spicules of bone extending from the underlying cortex into the tumor correspond mostly to trabeculae of reactive bone. Blotchy, punctate, and circular densities in the tumor

represent mineralization of chondroid tumor matrix and reactive bone [1]. The periphery of the lesion will have less mineralization. Periosteal osteosarcomas are much less dense radiographically than parosteal osteosarcomas, reflecting the difference in their histologic differentiation. The appearance on MR imaging is similar to that of cartilage tumors [4].

Periosteal osteosarcomas are treated with wide excision. Their prognosis is better than that of high-grade intramedullary or high-grade surface osteosarcomas but worse than that of parosteal osteosarcomas.

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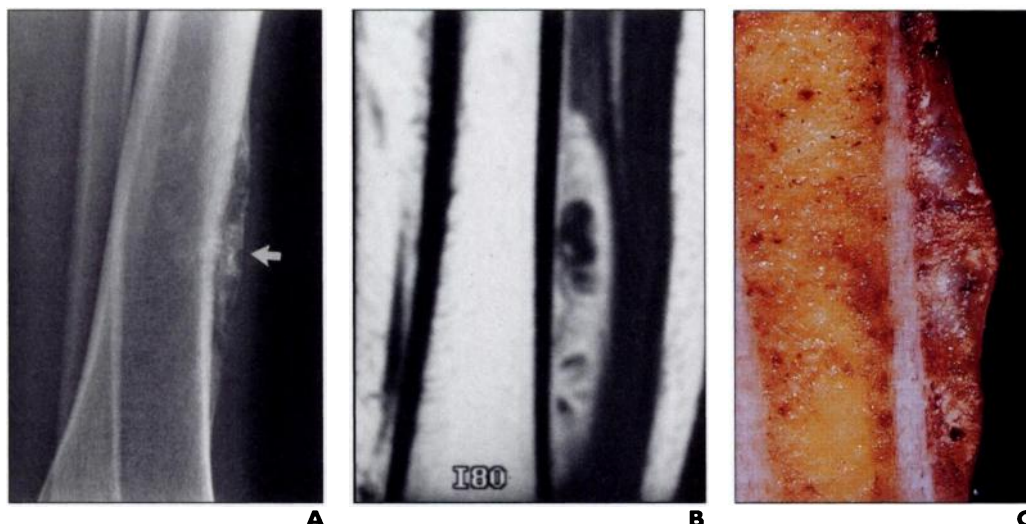


Fig. 1.—Periosteal osteosarcoma of tibia.

A, Oblique radiograph of distal tibia shows elongated, partially mineralized mass arising from cortex (arrow).

B, Coronal T1-weighted MR image after gadolinium injection shows enhancing mass apposed to intact cortex, with low-signal-intensity regions within.

C, Split gross section shows glistening lobules of cartilage within tumor.

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